

ENERGY NOTES - BRIDGFORD HOUSE, HORNINGHOLD, Leicestershire

~100% net Carbon-neutral living - ~50% zero-miles food - 100% carbon-free car travel

AROUND THE HOUSE

H.1. **Solar water heater** on rear roof above kitchen, feeds into hot water storage tank in airing cupboard. Tank has lower heat exchange coil from solar heater, higher coil from boiler system. Sufficient solar heat usually from late April to early October. *Installed 1999* (Note also the solar washing line!).

H.2. **Solar photovoltaic panels** - 46 panels with total 3 kW capacity. Joins household electricity through a dc/ac inverter. Electricity meters for PV generation, surplus export to grid and import from grid. Electricity supply company for import is 'Good Energy', 100% renewables. *Installed 2003.*

H.3. **Old boiler in stable**, in parallel with underground 'district' heating pipes from the new wood pellet boiler. Note the heat exchanger into the household 'radiator' heating circuit and the heat meter. Old boiler takes 'free' waste wood and large logs easily. *Old boiler installed about 1980, new boiler house 2014*

H.4. **South facing windows** capture solar heat. Unfortunate shading in winter from trees of this Conservation Area. Stable 'fill in' walls cavity insulated. Potentially an excellent location for a large conservatory and hence household heat.

H.5. **Secondary glazing** on all windows of the house. Glass is 'K glass' with infrared reflecting 'thermal' coatings. *Installed one room 1999 and all others 2006.*

H.6. **External insulation**, 200 mm thick and externally rendered. To all east, north and west walls. Vacuum panel wall insulation at west end. *Installed 2012*

H.7. **Wood store** - Wood needs at least 1 year to dry undercover and ventilated, better if 2 years. Takes waste wood and cuttings, as well as purchased large logs. Used (occasionally) for the old boiler and always for the kitchen wood range. *Installed 1996.*

H.8. **Wood pellet store** - Takes ~ 7 tonne of pellets blown in from an otherwise agricultural food-pellet delivery lorry. *Installed 2014*

H.9. **Wood pellet boiler in boiler house** - Austrian 'Herz' boiler, heat store tank and 'district' heating system underground to the house. Fully automatic. Pellets enter from adjacent store by an Archimedes screw. Used also for clothes drying, garden clothing, boot drying, mushroom growing. In operation from about early December to late March. Otherwise, kitchen range provides sufficient household heating to house radiators. *Installed 2014*

H.10. **Roof rain-water collection tanks** - Used for garden watering, car cleaning and duck-pond filling. *Installed ~ 2000.*

H.11. **Bathroom heat exchanger air ventilation** - Removes moisture, but recycles ~80% of the heat. *Installed 2015.*

GARDEN

G.1 Well ~ 10 m deep, built for the original stable of the estate. Now mains-connected electric pump connects to vegetable garden distribution of water pipes. *Built ~1905, pumping ~ 2000.*

G.2. Autonomous summer house - 12-volt solar PV panels (manufactured ~ 1985) charge a battery for LED lighting. Small wind turbine of ~ 1985 needs replacing. (to be connected to household electricity with extended capacity).

G.3. Vegetable garden - Aims for 12-month supply of basic vegetables. *Wasteland 1995, gradually dug from 1996*

INSIDE THE HOUSE

I.1. Kitchen wood-fired range (Stanley) - connected to hot water tank (upper coils) and radiator distribution. All radiators have adjustable thermostats, used as both 'on/off switches' and temperature controllers. Range provides kettle and cooking heat, kitchen comfort heat. Used September to mid May when needed. *Installed 1996.*

I.2. Snug wood pellet heater - Italian manufacture (elegant and adjustable). Pellet store behind the burner is hand-filled after about 14 hours burning. Used for comfort heat when room used. *Installed 2005.*

I.3. Open fire in dining room - Burns logs and ventilates room when used socially. *Installed at stable conversion ~ 1949; lined chimney from 1997.*

I.4. Sitting room 'Norwegian Jotul' wood stove (not connected to water heating) - Takes about 2 hours to 'come to radiating heat' and is then very efficient with secondary combustion of CO and H₂ gases. Logs from wood store. Used socially. *Installed 1996.*

I.5. Office wood stove - In practice burns junk mail, waste paper and cardboard, with occasional logs. *Installed 2012.*

GARAGE & WORKSHOP

GW.1. Workshop sun-pipe - No windows, so fixed above workbench. *Installed 2013*

GW.2. Fully electric cars

(i) Mitsubishi iMiEV - Range ~ 60 miles, as used for 80% of journeys, which are local. Has regeneration back into the battery when slowing and downhill; brakes hardly ever used. Easy, quiet, delightful driving. Has heater and air cooling, but this uses ~ 30% of charged power, so rugs and open windows used appropriately. Charged from 13 amp socket in garage, usually at times of otherwise exported PV daytime generated electricity. *Purchased ex-demo 2013*

(ii) Tesla 3. Range ~ 320 mile range. Purchased to replace a diesel car used [for] longer journeys. Programmable low-current charging function from ordinary household outlet (5 Amp) in daytime ensures that otherwise exported solar electricity is used for the charging. Battery cooling heat passes for cabin heating. So rugs are less necessary! *Purchased 2020.*

BASICS

B.1 Monitoring and records keeping - This is essential for low impact operation. University of Sheffield 'Microgen' data base used for monthly performance logging to compare with other solar generators.

B.2 Electricity supplier - 100% renewable energy from Good Energy

As at 3 Sept 2021